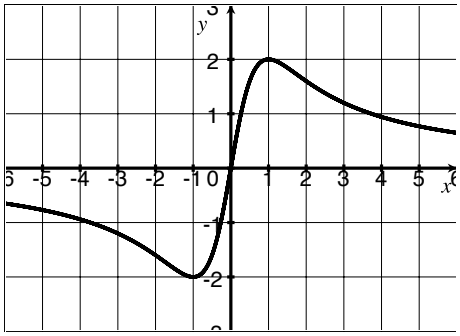
Exam 2 # TMath 126 Spring 2017

1. [12] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true and provide a brief justification. Otherwise, circle F and provide a counterexample or brief justification.

   (a) The graph on the right has the parametric equation $x(t) = t - \sin(t)$ and $y(t) = 1 - \cos(t)$.



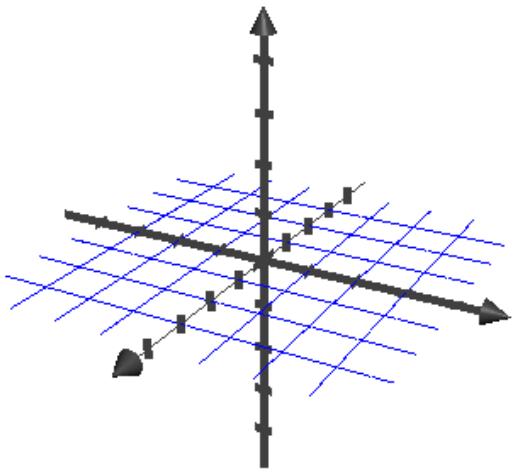
   (b) If $\vec{w}$ and $\vec{v}$ are vectors, then $(\vec{v} \cdot \vec{w}) + \vec{v}$ returns a vector.

   (c) The planes defined by $3x - y + 2z = 6$ and $0 = \langle 6, 2, 4\rangle \cdot ((x, y, z) - (0, 0, 1))$ are parallel to each other.

   (d) If $\vec{w}(t)$ and $\vec{v}(t)$ are vector-valued functions, then $(\vec{v}\,'(3) \cdot \vec{w}\,''(3)) + \vec{v}(2)$ returns a vector valued function.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

2. Consider the points $A(0,0,4)$, $B(2,3,0)$ and $C(1,-2,1)$.



   (a) [1] Find the components of $\overrightarrow{BA}$.

   (b) [2] Find the components of $\overrightarrow{BA} + 2\vec{j}$

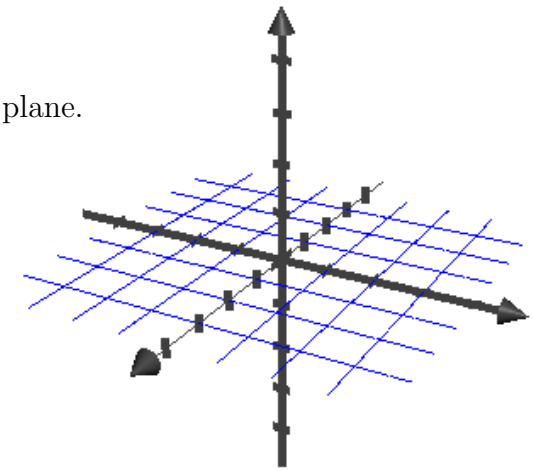
   (c) [4] Find the angle $\angle ABC$.

3. Let $\vec{r}(t) = \langle t\sin t, 3\sqrt{t}, e^t \rangle$

   (a) [3] Find $\vec{r}\,'(t)$.

   (b) [3] Find $\displaystyle\int \vec{r}(t)\,dt$

4. Consider M defined by all (x, y, z) such that $3x - 2y + 2z = 6$.

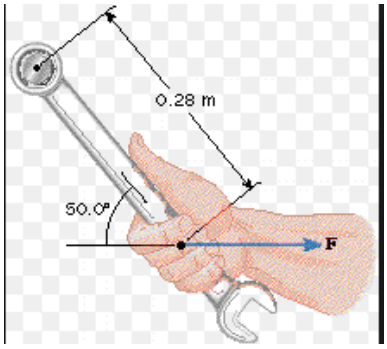


   (a) [2] Identify M as a point, vector, line, or plane. Justify your answer.

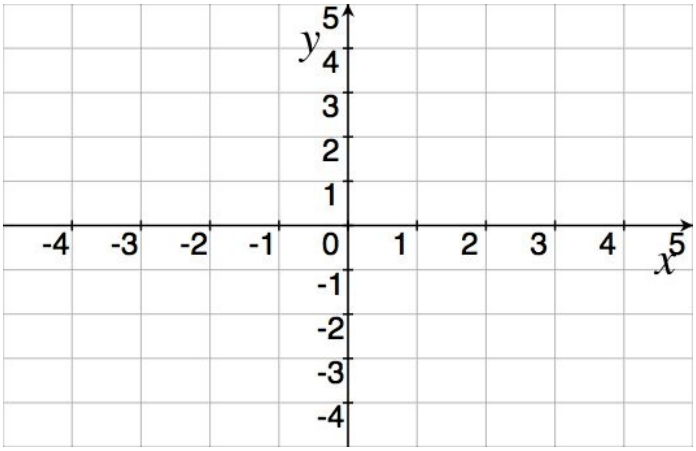
   (b) [1] What kind of object results when M intersects the yz plane?

   (c) [2] Find where M intersects the yz plane.

5. [5] Consider a .28 meter wrench is turning a bolt shown below. If the force acting on the wrench is 92 Newton meters, what is the torque experienced by the bolt?

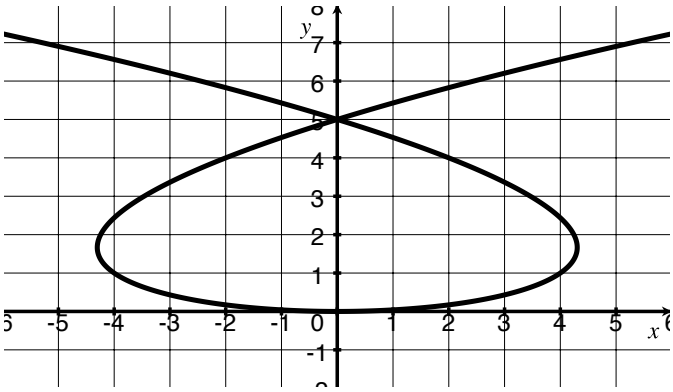


6. [3] Consider the parametric equations $x(t) = t-3$ and $y(t) = \frac{t}{t-3}$. Write the corresponding rectangular equation by eliminating the parameter and then graph the function.



7. Consider the parametric equation $x(t) = t^3 - 5t$ and $y(t) = t^2$.

   (a) [3] Looking at the graph, approximate where $\frac{dy}{dx}$ is not defined.



   (b) [4] Find the equation of *one* of the lines tangent to the above parametric equations at $(0, 5)$.